Spatial variability of soil organic carbon in oil palm.

ABSTRACT

This study aimed at quantifying the spatial variability of SOC and estimating SOC concentration in oil palm. This study was carried out in a commercial oil palm plantation bearing 27 year old palms. A systematic design was employed for soil sampling at the 0-20 cm depth based on a cluster of 4 palms that included three operational areas Weeded Circle (WC), Frond Heap (FH) and Harvesting Path (HP). A total of 60 sampling clusters were established. SOC was analyzed using dry combustion method. All measurement points were geo-referenced by a differential Global Positioning System (dGPS). The SOC data were first explored using descriptive statistics, normality check and outlier detection. This followed by variography and interpolation techniques to quantify the spatial variability of SOC. Results showed that all three operational areas exhibited a definable spatial structure and were described by either spherical or exponential models. SOC from WC and HP showed moderate spatial dependence while that from FH showed a strong spatial dependence. The FH had a shorter effective range than other operational areas. Contour maps for WC, FH and HP clearly showed spatial clustering of SOC values. All three operational areas fulfilled the interpolation accuracy criteria. This study suggests that site-specific management could be considered as a strategy to increase SOC sequestration in oil palm.

Keyword: Soil organic carbon; Spatial variability; Oil palm; Operational areas; Site-specific management; Carbon sequestration